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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Fumihiko Kimura

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EXAMINER

ORTIZ RODRIGUEZ, CARLOS R

ART UNIT

PAPER NUMBER

2123

NOTIFICATION DATE

DELIVERY MODE

12/21/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentmail@whda.com

Office Action Summary	Application No. 10/590,704	Applicant(s) KIMURA ET AL.	
	Examiner CARLOS ORTIZ RODRIGUEZ	Art Unit 2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-34 is/are pending in the application.
- 4a) Of the above claim(s) 11-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 November 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-7 and 9-34 are pending.
2. Claims 1-7 and 9-10 are rejected.
3. Claim 8 is cancelled.
4. Claims 11-34 are withdrawn from consideration.
5. The amendments to the Specification is received and entered.
6. The drawing "Replacement Sheets" are received and entered.

Specification

7. The disclosure is objected to because of the following informalities: The section labeled: "Brief Description of the Drawings" must be amended to delete the brief descriptions that correspond to the deleted drawings; and also to reflect the change in the "figure numbering". Note that Applicant cancelled Figures 46-70, and renumbered figures 71-74 as Figures 46-49. Also note that, newly renumbered figure 46-49 are not referred to in the "Detailed Description" of the Specification. Appropriate correction is required.

Continued Examination Under 37 CFR 1.114

8. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/09/09 has been entered.

Response to Arguments

9. Applicant's arguments filed 11/09/09 have been fully considered but are not persuasive.

On Page 26 Lines 17-18, Applicant's arguments indicate that "it is difficult to express the spatial clothoidal curve of the Szu reference in the form of a formula". Please note that although it might be difficult, Szu discloses the limitations of claim 1, as described in the rejection below. Claim 1 indicates that the pitch angle and yaw angle are given by a quadratic expression comprising a curve length or a curve length variable. Please note that in order to describe the pitch angle and the yaw angle of the three-dimensional clothoidal curve using a quadratic expression, "curve lengths and curve length variables" must be utilized. Claim 1 merely requires a quadratic expression comprising of a curve length or a curve length variable. A positive and clear relationship/dependency between the pitch angle and the yaw angle with respect to the curve length or the curve length variable is not recited.

On Page 28 Lines 8-10, Applicant indicates that “Szu fails to define the spatial clothoidal curve in a form of a simple formula. Actually, the coordinates of the spatial clothoidal curve may be calculated as numerical values, but a formula defining the spatial clothoidal curve can hardly be made”. It is not clear what Applicant means with “simple formula” or “the spatial clothoid curve can hardly be made”. These statements appear to be an admission that although it might be complex or difficult, the Szu reference implicitly discloses that each of a pitch angle and a yaw angle in a tangential direction of said three-dimensional clothoid curve is given by a quadratic expression comprising of a curve length or a curve length variable (as presented in the Final Office Action, specifically see rejection of claim 1). If applicant’s intention is to indicate that a “quadratic expression” is a “simple” formula please note that Szu discloses a simple/quadratic polynomial/formula, see col. 5 lines 64-67.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-2 and 9-10 are rejected under 35 U.S.C. 102 (b) as being anticipated by Szu et al. U.S. Patent No. 5,909,965 (hereinafter Szu).

Art Unit: 2123

a. **Regarding claims 1 and 9-10**, Szu discloses generating a three-dimensional clothoid curve by the computer (C7 L6-32 - - see for example the expressions of the spatial Clothoidal curve);

and designing a shape of said industrial products based on the three-dimensional clothoid curve by the computer (C7 L27-39 and C8 L5-11 - - see for example using Clothoidal curves to design rolling element passages).

Szu implicitly discloses that each of a pitch angle and a yaw angle in a tangential direction of said three-dimensional clothoid curve is given by a quadratic expression comprising of a curve length or a curve length variable (C4 L65-67, C5 L1-7, C5 L58-65, C6 L28-36 and C7 L7-34 - - see for example that the curvature of a clothoidal curve varies continuously and proportionally linearly to its arc length from the initial point of the curve).

b. **Regarding claim 2**, Szu further teaches the industrial products being a machine including a mechanism in which a mechanical element having a mass moves and that a trajectory of motion of a mechanical element is designed by using the three-dimensional curve (C7 L33-38 and C8 L7-11 - - see for example designing rolling element passages using spatial clothoidal curves).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2123

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Szu et al. U.S. Patent No. 5,909,965 (hereinafter Szu) in view of Drennen et al. U.S. Publication No. 2002/0189385 (hereinafter Drennen).

a. **Regarding claim 3**, Szu teaches all the limitations of the base claims as outlined above.

But Szu fails to clearly specify the machine is a screw device including a mechanism in which a ball as the mechanical element moves, the screw device comprises a screw shaft having an outer surface on which a spiral rolling element rolling groove is formed, a nut having an inner surface on which a load rolling element rolling groove is formed so as to be opposed to the rolling element rolling groove and a regression path is formed to connect a one end and the other end of the load rolling element rolling groove, and a plurality of rolling elements disposed between the rolling element rolling groove of the screw shaft and the load rolling element rolling groove of the nut and disposed in the regression path, and the regression path of the screw device is designed by using the three-dimensional curve.

However, Drennen teaches a screw device including a mechanism in which a ball as a mechanical element moves, the screw device comprises a screw shaft having an outer surface on which a spiral rolling element rolling

groove is formed, a nut having an inner surface on which a load rolling element rolling groove is formed so as to be opposed to the rolling element rolling groove and a regression path is formed to connect a one end and the other end of the load rolling element rolling groove, and a plurality of rolling elements disposed between the rolling element rolling groove of the screw shaft and the load rolling element rolling groove of the nut and disposed in the regression path, and the regression path of the screw device is designed by using the three-dimensional curve (see for example the Abstract and Paragraphs 0002, 0007 and 0033).

Szu and Drennen are analogous art because they are from the same field of endeavor. They both relate to systems for designing/manufacturing products with three-dimensional curvature surfaces and products with three-dimensional curvature surfaces.

Therefore at time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the above teachings taught by Szu and combining them with the teachings taught by Drennen.

One of ordinary skill in the art would have been motivated to do this modification in order to obtain a smooth reversing motion increasing mechanical efficiency as suggested by Szu (see for example, C2 L53-55).

14. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szu et al. U.S. Patent No. 5,909,965 (hereinafter Szu) in view of Drennen et al. U.S. Publication No. 2002/0189385 (hereinafter Drennen) and in view of Hirai et al. U.S. Patent 6,587,747 (hereinafter Hirai).

a. **Regarding claim 4**, the combination of Szu and Drennen teach all the limitations of the base claims as outlined above.

But the combination of Szu and Drennen fails to specifically express the three-dimensional clothoidal curve expressions of claim 4.

However, please note that the equation expressions, parameters and variables present in claim 4 are characteristics of the three-dimensional clothoid curve and are obtainable by performing mathematical manipulations known in this art.

Hirai teaches similar mathematical manipulations and expressions (see for example C8 L1-27).

Szu, Drennen and Hirai are analogous art because they are from the same field of endeavor. They all relate to systems for designing/manufacturing products with three-dimensional curvature surfaces and products with three-dimensional curvature surfaces.

Therefore at time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the above teachings taught by the combination of Szu and Drennen and combining them with the teachings taught by Hirai.

One of ordinary skill in the art would have been motivated to do this modification in order to improve the smoothness of the path where a mechanical element moves as suggested by Hirai (see for example, C3 L29-36).

Art Unit: 2123

b. **Regarding claim 5**, the combination of Szu, Drennen and Hirai teach all the limitations of the base claims as outlined above. Hirai further teaches that a plurality of spatial points are specified in a three-dimensional coordinate system and these spatial points are interpolated by using a three-dimensional curve (see for example C4 L30-32 and C9 L48-55).

c. **Regarding claim 6**, the combination of Szu, Drennen and Hirai teach all the limitations of the base claims as outlined above. Szu further further teaches that, between a one three-dimensional clothoid segment and the next three-dimensional clothoid segment, positions, tangential directions, normal directions, and curvatures of both the one and next three-dimensional clothoid segments are made continuous to each other, respectively, at the plurality of spatial points (see for example C5-C7).

d. **Regarding claim 7**, the combination of Szu, Drennen and Hirai teach all the limitations of the base claims as outlined above. The combination of Szu, Drennen and Hirai further teach the limitations of claim 7 because the equation expressions, parameters and variables present in claim 7 are characteristics of the three-dimensional clothoid curve and are obtainable by performing mathematical manipulations known in this art.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Ortiz-Rodriguez whose telephone number is 571-272-3766. The examiner can normally be reached on Mon-Fri 10:00 am- 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Carlos Ortiz-Rodriguez
Patent Examiner
Art Unit 2123

December 17, 2009

/Paul L Rodriguez/
Supervisory Patent Examiner, Art Unit 2123